



**Aerospace
Systems Division**

Analysis of Reserve Power Telemetered
Data for Qual SA Post Vibration IST

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ATM-797	
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Analysis of telemetered reserve power data during ALSEP Qual SA testing provides an insight into the proper use of this data in conjunction with other telemetered information. The information is applicable to all ALSEP Flight Models.

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During analysis of data from the ALSEP Qual SA Post Vibration Integrated System Test (TP 2333034, Rev. D), a very unusual coincidence occurred. This happened while performing paragraph 6.5.13, page 5-29, of the "as run" test procedure in which Experiment No. 5 commands were transmitted.

Experiment No. 5 is not an experiment, but two commandable heaters located inside the Central Station. Both heaters are off when Experiment No. 5 is off. When Experiment No. 5 is in STANDBY the 5 watt heater is ON. With Experiment No. 5 in POWER ON, the 10 watt heater is ON.

During the test, Experiment No. 5 was commanded to POWER ON and reserve power decreased 10 watts as expected. When Experiment No. 5 was commanded to STANDBY, however, there was a 10 watt increase in reserve power instead of the expected 5 watts. Further, there was a negligible change in reserve power when Experiment No. 5 was commanded OFF.

Figure 1 depicts the foregoing changes in reserve power in response to the three Experiment No. 5 switching commands. This is an apparent discrepancy and was first thought to be caused by transmission of the wrong command, i. e., Experiment No. 5 to OFF, instead of STANDBY. This is not possible, however, since experiments cannot be switched directly from ON to OFF, but must go from ON to STANDBY and then to OFF. A switching malfunction was ruled out since HK-14 read octal 43, verifying that Experiment No. 5 status was STANDBY.

The next possibility investigated was the Magnetometer Experiment heater cycling. The Magnetometer heater uses approximately 5 watts when ON, and conversely causes a 5 watt increase in reserve power when it cycles OFF. If these heater cycles occurred coincidentally with the latter two Experiment No. 5 commands, they could produce the results obtained.

Figure 2 is an expanded plot of reserve power from HK-8 data covering a longer time period. As can be seen, heater cycles with a period of approximately 17 minutes occur on either side of the Experiment No. 5 anomaly. It is reasonable to predict that a heater cycle occurred at approximately the same time as the Experiment No. 5 switching commands, as shown by the dash lines near the center of the plot.



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LSM-06 data which provides the Magnetometer heater ON-OFF status was obtained from the MC-4000 printout tape. The data points show the cycling of the heater and are plotted in conjunction with HK-8 data in Figure 3. The so called "heater cycles" in Figure 2 are actually the phasing of the HK-8 data points with the heater off (high reserve power) portion of the Magnetometer heater cycles.

The heater cycles shown on Figure 3 are approximations to the extent that the LSM-06 heater status is telemetered every 9.6 seconds and only when the heater status changes. In depicting the heater power profile it was assumed that the steps occurred 4.8 seconds prior to each heater status change.

The apparent heater cycles shown in Figure 2 are caused by the difference between the HK-8 period of 54 seconds and the slower heater cyclic period of approximately 57 seconds. With HK-8 gaining on the order of 3 seconds per minute, it requires approximately 17 to 19 minutes to traverse the 51 to 57 second low interval between the heater high (OFF) peaks.

The reserve power readings during these high peaks are misleading since they are not a true indication of the actual reserve power available. Further, in the particular instance discussed herein, an apparent discrepancy in Experiment No. 5 switching was indicated which was not true. A continuous analog trace of reserve power would have quickly revealed what was actually happening, however, the Sanborn Recorder was not operating during this portion of the test.

Perhaps it is fortunate that the analysis was performed with the same type of ALSEP data that will be received from the moon. It points out that HK-8 data alone does not tell the full story, but must be used in conjunction with other data to get a true picture of what is happening as was shown in Figure 3.

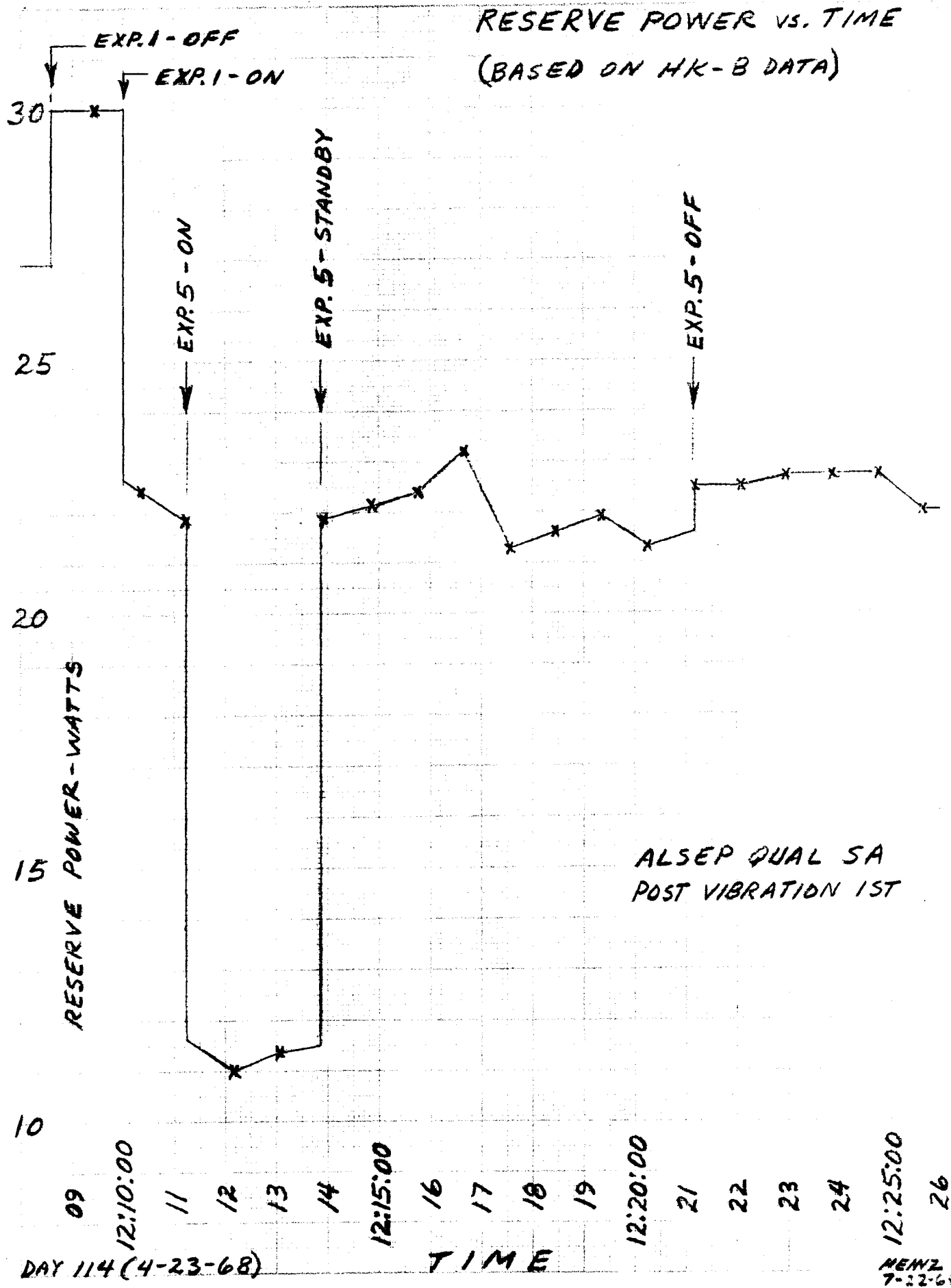


FIGURE 1

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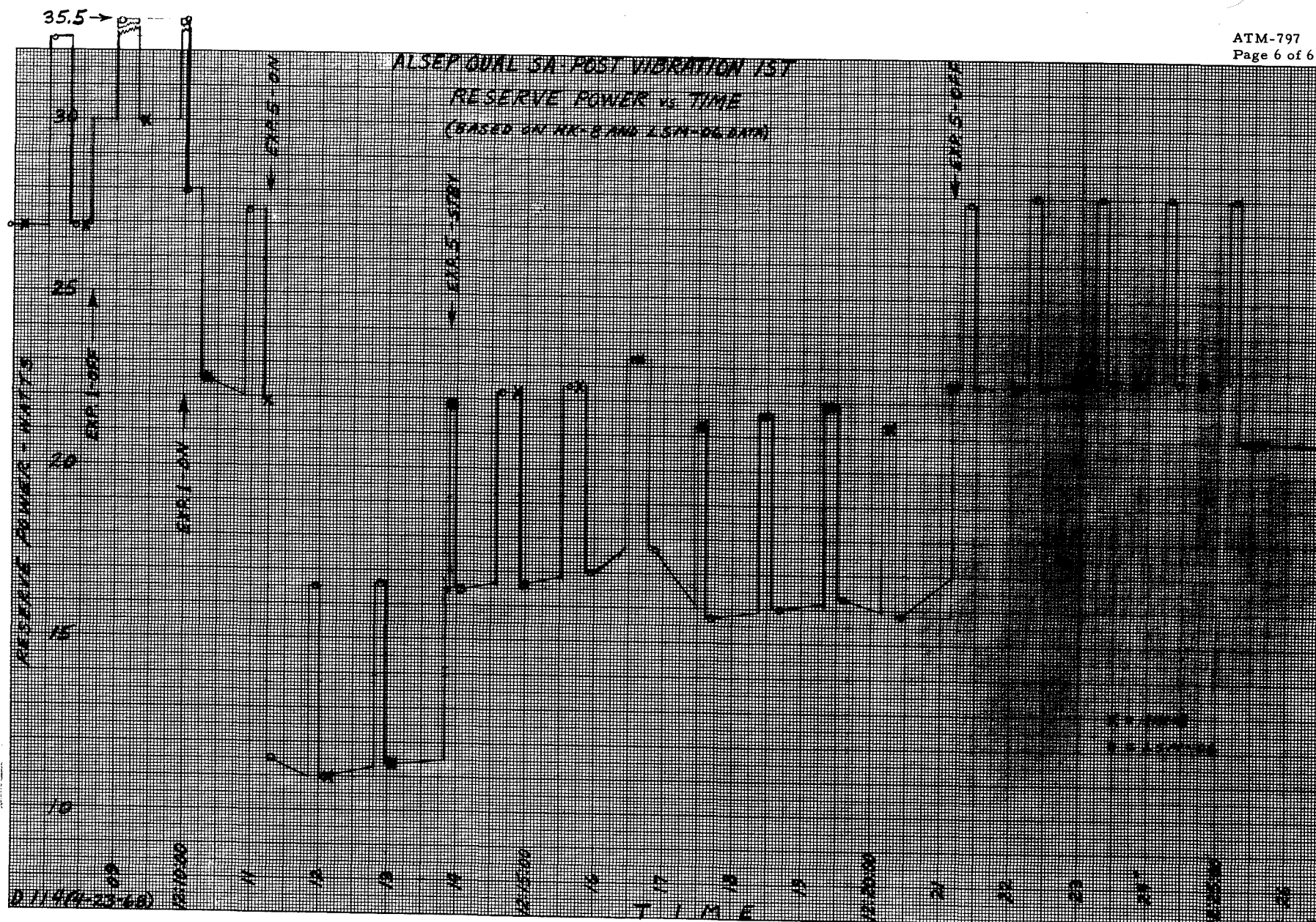


FIGURE 3

1-23-6

K&W
10 X 10 TO THE CENTIMETER 47 1513
25 X 25 CM. MADE IN U.S.A.
KEUFFEL & ESSER CO.

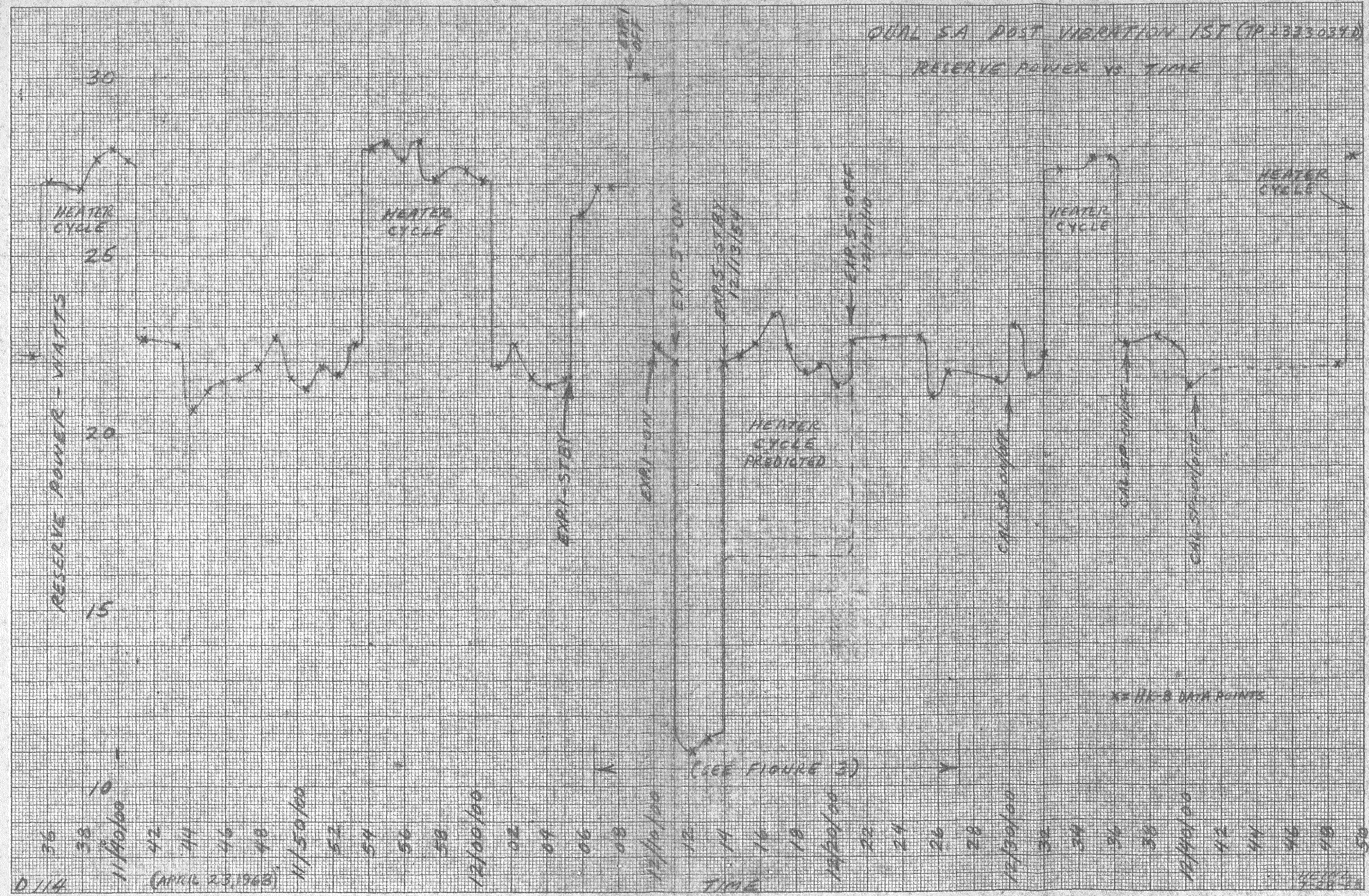


FIGURE 2

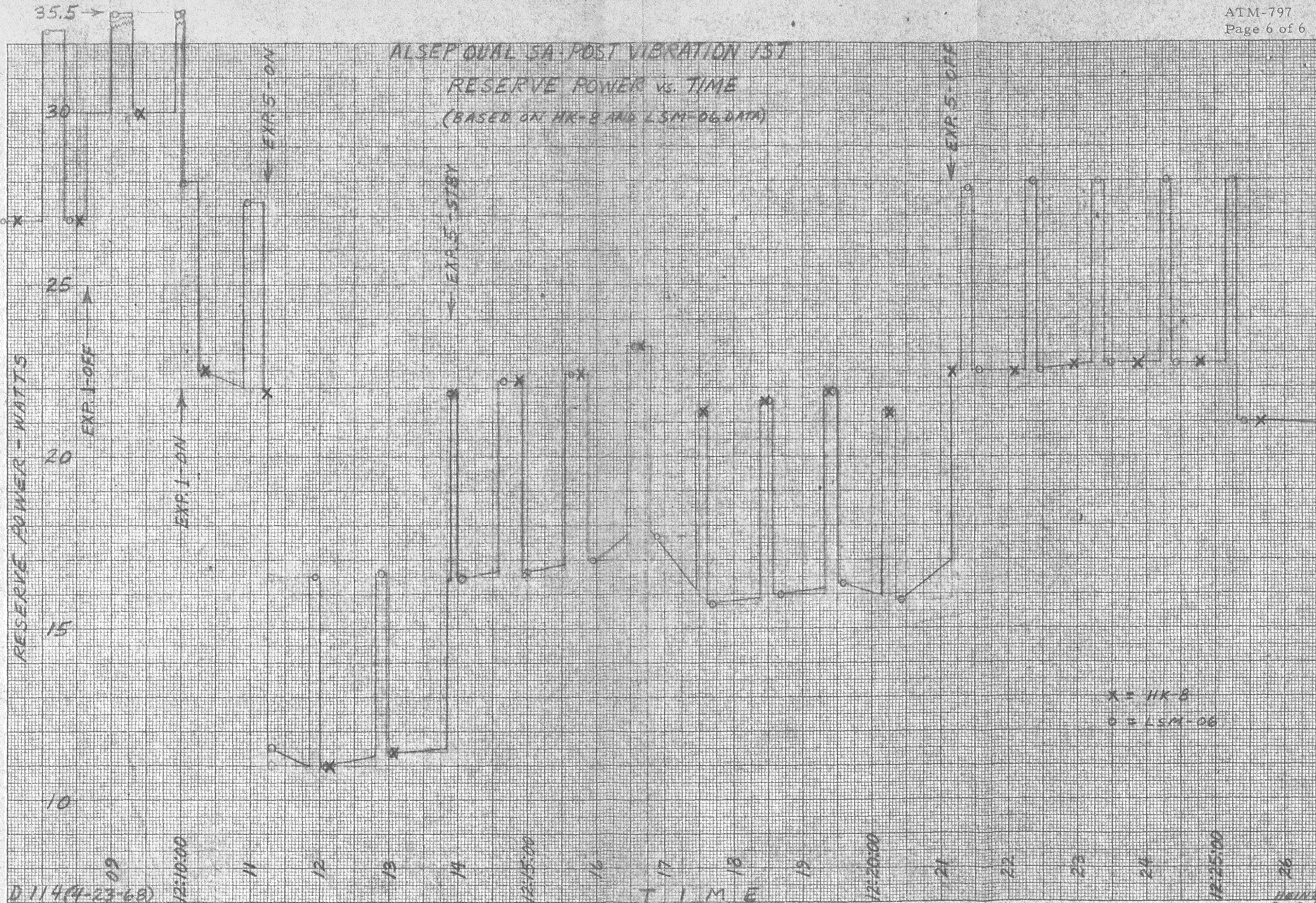


FIGURE 3